A Study of Prevalence of Human Intestinal Parasites in Wadi Al-Shati Region

Gelani Saleem Saad,* Abdul Hafeez Khan,** Abdul Gader Ajaili,*** Awatif Mohamad Abdulsalam,* Mohamed Al-Shebani,* and Yosef Kubti,****

Abstract:
Background: Intestinal parasites cause significant morbidity and mortality throughout the world. The prevalence of intestinal parasites is not recorded so far in the population of Wadi Al-Shati province of Libya. Objectives: to determine the prevalence of intestinal parasites among random population of different rural localities of Wadi Al-Shati province, south-west, Libya.
Materials and Methods: a total of 1192 stool samples (during the period from 1st of August 2007 to end of April 2008) were collected from randomized population of seventeen rural localities of Wadi Al-Shati province. All stool specimens were examined by direct-smear microscopy, and formalin-ether concentration for the detection of intestinal parasites in normal saline and Lugol's iodine preparations.
Results: Out of 1192 stool samples, 284 (23.82 %) were found positive by the direct smear microscopy, and 294 (24.66 %) by the formalin-ether sedimentation method. There was no significant difference (P>0.05) between direct smear and concentration method for the detection of intestinal parasites in stools. Prevalence of intestinal parasites between males and females was not statistically significant (P>0.05). Blastocystis hominis was the commonest (20.21%) parasite found among the population. Cryptosporidium spp. (2.5 %), Giardia lambila (1.76 %), Entamoeba histolytica/ E. dispar (1.17 %) and Entamoeba coli (0.92 %) were detected in stool samples. Other intestinal parasites present included were Trichomonas hominis (0.80%) and Ascaris lumbricoides (0.80%).
Conclusion: the helminthes infections are uncommon in Wadi Al-Shati province, probably due to climatic conditions (dry, hot and sandy soil) of this region. Prevalence of intestinal parasites would provide the baseline data to clinicians and health authorities for the treatment parasitic infections in community of this region.

Introduction:
The high frequency of intestinal parasites in a population of a region indicates low socio-economic development or conditions, poor medical care, occupational categories and low standard hygiene. Libyan Arabia Jamahiriya is a developing country, and people in communities usually have high standard of cleanliness, general good health, clean water supply and proper sewage disposal. An enormous increase in the number of expatriates is a result of economic growth of Libya. The prevalence of intestinal parasites has been found higher in expatriates arriving from developing countries. Full information about intestinal parasites in Libyan Arab Jamahiriya is lacking, despite some reports. The commonest protozoan infections are Blastocystis hominis followed by Entamoeba histolytica / Entamoeba dispar or Giardia lambila and Entamoeba coli among Libyan population. Moreover, Cryptosporidium spp infections have been reported in Libya among patient particularly in children with diarrhea. The detection of Cryptosporidium spp is not routinely done in laboratories. For this reason, frequency of cryptosporidiosis and source of infections are not fully known in Libya. Relatively low infections rates of helminthes have been reported in this country. Saleh and Ben Mousa and Ibrahim did not find helminthes infections among outpatients in Sebha and school aged children in Tripoli respectively. However, Ben Mousa in an other study reported helminthes in the stool samples of school aged children in Tripoli.

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In the present study, attempts were made to find out prevalence of intestinal parasites among random population of Wadi Al-Shati using direct smears and formalin sedimentation.

**Materials and Methods:**

**Study area:**

Zone of Wadi Al-Shati municipal branch, approximately at 27-28 N latitude in the corner of Libya (Fig. 1). The area of this Zone measures about 160 km² with a population over seventy eight thousand five hundred thirty two.

The stool samples were collected from seventeen rural localities of Wadi Al-Shati. Extended from east to west are (Ashkidah, Qirah, Brack, Al-Zauia, Zuwayah, Tamzawah, AQar, Mahrugah, Al-Qardah, Tarut, Qutta, Bergen, Zahra, Wanzarik, Tamssan, Mansurah and Idri).

**Samples:**

During the period between first of August 2007 to end of April 2008, a total of 1192 stool samples. (22 from Ashkida, 60 from Qirah, 238 from Brack, 37 from Al-Zauia, 53 from Zuieia, 101 from Tamzawah, 96 from Aqar, 91 from Mahrugah, 120 from Al-Qardah, 15 from Tarout, 96 from Qattah, 39 from Barqan, 114 from Zahra, 51 from Wanzarik, 8 from Tamssan, 34 from Mansoura and 17 from Idri). were randomly collected from individuals, who lived in Wadi Al-Shati region for the detection of intestinal parasitic infections. Out of 1192, 509 males and 683 were females. The population aged from less than one year to ninety years old. Stool samples were collected in closed and labeled disposable plastic containers. Data about age, sex and place of residence were obtained from questionnaire giving to all individuals.

**Direct saline wet preparation:-**

The direct saline smear was prepared by mixing a small amount of feces with a drop of normal saline (0.85%). These mixtures provide a uniform suspension under 22X 22 mm cover slip. The entire cover slip area was examined using low power (10 X) then high power objective (40X).

Iodine wet preparation was made by using Lugol's iodine solution. A drop of iodine solution was placed on a glass slide. By using piece of stick, small amount of feces was mixed with iodine and covered by glass cover slip. The preparation examined under microscope using low power then high power objective.
Concentration method:-
Formalin-ether sedimentation method:-
Formalin-ether sedimentation concentration technique was performed for the concentration of intestinal parasites as described by Chessbrough.  

Modified acid-fast stain:-
Modified Ziehl-Neelsen (ZN) acid-fast stain was used to identify the oocysts of Coccidian parasites in the fecal specimens following the procedures described by Garcia et al  

Results:
A total of 1192 stool samples were collected, screened for the presence of intestinal parasites using direct smear microscopy, and formalin-ether sedimentation in the Parasitology Laboratory of Medical Technology, Brack. Of 1192 subjects investigated, the positive rate of intestinal parasites in stool specimens was 24.66% (294/1192). All the stool specimens found positive in direct smear microscopy (saline and iodine smears) the specimens were also found positive in concentration technique for intestinal parasites. Formalin-ether method detected 10 more number of positive samples which were negative in direct smear microscopy. Table 1, shows the comparison of direct smear microscopy and formalin-ether sedimentation for the detection of intestinal parasites in the fresh stool samples, collected from various localities of Wadi Al-Shati province. No, significant difference (P>0.05) was found between smear microscopy and concentration method for the detection of intestinal parasites. The results of this study showed, that females were found to have higher prevalence rates than males. 10.48% (125 / 1192) males and 14.17% (169 / 1192) females were found to be infected with intestinal parasites in various localities. There was no significant difference between them (P>0.05). The higher (5.70%) and lower (0.08 %) positive rate was found among 21 to 30 years aged and 81 to 90 years old age group respectively. The positive rate of parasites according to their residency of population in rural localities of Wadi Al-Shati is presented in Table 2. The prevalence rate varies from 0. 08 to 4.36%. Intestinal parasites were not recorded in the stools of random population of Tarout and Ashkida villages of Wadi Al-Shati province.

<table>
<thead>
<tr>
<th>No. examined</th>
<th>Direct smear microscopy</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1192</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saline / Iodine</td>
<td>Formalin-ether sedimentation</td>
</tr>
<tr>
<td>284 (23.82)</td>
<td>294 (24.66)*</td>
<td></td>
</tr>
</tbody>
</table>

*P= > 0.05

The infection with a single parasite was higher 22.56% (269 / 1192), followed by double infection 2.01 % (24 / 1192), and triple infection 0.08 % (1 / 1192) among positive samples. The results of present study are compared with other studies carried out in Libyan Arab Jamahiriya in Table 3. Blastocystis hominis was most frequently recorded (20.21 %) in the stool specimens of population of Wadi Al-Shti region. The other protozoan seen in the fecal samples were Cryptosporidium spp, (2.51 %), Entamoeba histolytica / Entamoeba dispar (1.17 %), Giardia lamblia (1.76 %), Entamoeba coli (0.92 %) and Trichomonas hominis (0.08 %). Out of 1192 stool samples examined, only one (0.08 %) was found to be positive for Ascaris lumbricoides. No, other helminthes were recorded in the stool of random population of Wadi Al-Shati.

Discussion:
A total of 1192 stool samples were collected for the detection of intestinal parasites from seventeen rural localities. Overall the prevalence of intestinal parasites was 24.66 % (294/1192) and there was no significant difference (P>0.05) in the positive rates between males and females, residing in the rural localities of Wadi Al-Shati province. The results are almost similar to the studies of Dar et al  

Table 1: Comparison of methods for the detection of intestinal parasites.
among primary school children in Derna and 42% in school aged children in Tripoli respectively and suggested that infection of intestinal parasites was related to the education, socio-economic status of the family, source of water for human consumption and size of family. However, lower prevalence rates of intestinal parasites 12.0%, 12.88% and 14.2% have been found in Al-Baida (23), Benghazi (3) and Tripoli (24) respectively.

Results also different from Dar and Friend,16 who reported comparatively higher prevalence of intestinal parasites (78.0%) among children in closed communities in Benghazi city (orphans, mental institutes and prisons). The high incidence of intestinal parasites in these communities probably due to lack of standards of environmental sanitation, personal hygiene and selection of samples, and the transmission of parasites was being maintained locally through contamination of food and water and soiled fingers. Moreover, Salem et al25 also determined higher prevalence of intestinal parasites (76.0%) among Libyan patients in Sirt city.

The data of present study showed a higher prevalence rate of Blastocystis hominis (20.21%) compared to other intestinal parasites. This finding is almost accordance with other studies made in Sebha city 18.55%,9 22.69%11 and 26.61%26 prevalence of B. hominis. However, a higher prevalence (29.6%) of B. hominis has been found among Libyan patients in Sirt city.25 Moreover, lower positive rate of B. hominis has been also reported in Libya, 6.7% in Derna (18) and 12.57% in Sirt (27).

Al-Fellani et al8 reported commonest incidence of B. hominis among the outpatients in Sebha city, and suggested that dry and hot weather of this region favoring the survival and transmission of this organisms in the population of Sebha.

The results are also consistent with the findings of Mohammed et al,28 who reported that the prevalence of B. hominis in Sebha was significantly more in summer than in winter season. Prevalence of B. hominis has also been found higher during warm and hot season compared to pre monsoonal month, spring and winter of the years in the other parts of the world.29-31 Moreover, dry season and warm weather favor the development of intestinal protozoan parasites in Nigeria and Turkey.32,33 Moreover, oocysts of protozoan are relatively more resistant against adverse environmental conditions.34,35 Thus, dry and hot weather conditions conjugation with sandy soil of Wadi Al-Shati province might be suitable for the viability, survival and transmission of B. hominis in this region.

Table 2: Prevalence of intestinal parasites according to localities among random population of Wadi Al-Shati province.

<table>
<thead>
<tr>
<th>Area</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
<th>Total (%) Prevalence</th>
<th>Female (%)</th>
<th>Male (%) Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashkidah</td>
<td>12</td>
<td>10</td>
<td>22</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Qirah</td>
<td>33</td>
<td>27</td>
<td>60</td>
<td>15</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Brack</td>
<td>121</td>
<td>117</td>
<td>238</td>
<td>52</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>Al-Zauia</td>
<td>14</td>
<td>23</td>
<td>37</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Zuwayah</td>
<td>34</td>
<td>19</td>
<td>53</td>
<td>10</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Tamzawah</td>
<td>47</td>
<td>54</td>
<td>101</td>
<td>23</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Aqar</td>
<td>37</td>
<td>59</td>
<td>96</td>
<td>16</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Mahrugah</td>
<td>45</td>
<td>46</td>
<td>91</td>
<td>16</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Al-Qardah</td>
<td>32</td>
<td>88</td>
<td>120</td>
<td>41</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>Tarut</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Quttah</td>
<td>39</td>
<td>57</td>
<td>96</td>
<td>37</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Berqen</td>
<td>19</td>
<td>20</td>
<td>39</td>
<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Zahra</td>
<td>15</td>
<td>99</td>
<td>114</td>
<td>35</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Wanzarik</td>
<td>33</td>
<td>18</td>
<td>51</td>
<td>17</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Tamssan</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>1</td>
<td>Nil</td>
<td>1</td>
</tr>
<tr>
<td>Mansurah</td>
<td>11</td>
<td>23</td>
<td>34</td>
<td>14</td>
<td>7</td>
<td>7</td>
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<tr>
<td>Idri</td>
<td>5</td>
<td>12</td>
<td>17</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>509</td>
<td>683</td>
<td>1192</td>
<td>294</td>
<td>125</td>
<td>169</td>
</tr>
</tbody>
</table>

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Table 3: Prevalence of intestinal parasites in Libyan Arab Jamahiriya

<table>
<thead>
<tr>
<th>References</th>
<th>Category/ locality</th>
<th>Entamoeba histolytica / E.dispar</th>
<th>Entamoeba coli</th>
<th>Giardia lamblia</th>
<th>Blastocystis hominis</th>
<th>Cryptosporidium spp</th>
<th>Ascaris lumbricoides</th>
<th>Hymenolips nana</th>
<th>Enterobius vermicularis</th>
<th>Trichuris trichura</th>
<th>Ancylostoma duodenale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dar et al (1979).</td>
<td>School children in Benghazi.</td>
<td>2.4 NR 11.4 NR NR NR NR NR NR</td>
<td></td>
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<tr>
<td>Dar and Friend (1979).</td>
<td>Closed communities in Benghazi.</td>
<td>44.4 NR NR NR NR 2.3 1.6 0.8 1.6</td>
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<tr>
<td>Bolbol et al (1981).</td>
<td>Outpatients in Tripoli.</td>
<td>8.3 NR 8.7 NR NR 1.7 0.38 NR 0.38 0.19</td>
<td></td>
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<tr>
<td>El-Buni et al (1998).</td>
<td>Expatriates in Benghazi.</td>
<td>27.0 15.1 7.8 NR NR 2.8 3.4 NR 2.2 0.7</td>
<td></td>
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<td></td>
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<tr>
<td>El-Buni and Khan (1998).</td>
<td>Children attending Hospital in Benghazi.</td>
<td>3.9 2.62 6.2 NR NR NR NR NR NR</td>
<td></td>
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<tr>
<td>Al-Tawaty et al (1998-2002).</td>
<td>Children with diarrhea in children Hospital Benghazi.</td>
<td>2.82 NR 3.77 NR 7.54 NR NR NR NR NR</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Al-Fellani et al (2005).</td>
<td>Outpatients in Sebha.</td>
<td>6.63 0.35 1.62 18.55 NR 0.06 0.11 0.17 NR NR</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Salem et al (2007).</td>
<td>Libyan patients in Sirt.</td>
<td>35.9 4.7 7.2 29.5 NR NR NR NR NR</td>
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<tr>
<td>Sadaqa and Khassem (2007).</td>
<td>Primary school children in Derna</td>
<td>6.6 3.2 12.7 6.7 NR 0.1 0.1 NR NR 0.6</td>
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<tr>
<td>Saleh (2007)</td>
<td>Out patients in Sebha</td>
<td>5.24 0.21 1.28 22.69 NR NR NR NR NR</td>
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</tr>
<tr>
<td>Ben Mousa (2007)</td>
<td>School aged children in Tripoli</td>
<td>4.0 4.0 2.0 NR NR 20.0 6.0 4.0 14.0 NR</td>
<td></td>
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<tr>
<td>Present study</td>
<td>Random population of Wadi Al-Shati</td>
<td>1.17 0.92 1.76 20.21 2.51 0.08 NR NR NR NR</td>
<td></td>
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</tbody>
</table>

NR= Not recorded.
In Libya, infections of *B. hominis* are mentioned on Hospital based studies among the patients and epidemiology and transmission is completely not understood.

The results of this study showed a lower positive rate of *E. histolytica* / *Entamoeba dispar* (1.17 %) and *G. lamblia* (1.76 %) in the stools of random population in various rural localities of Wadi Al-Shati province. These results are almost similar to those of Dar *et al.*, Ali *et al.*, AL-Fellani *et al.*, Ben Mousa, Saleh, who reported lower prevalence rates of *E. histolytica* / *Entamoeba dispar* (2.4% in Benghazi) and *G. lamblia* (1.2 % in Zliiten), (1.62% in Sebha), (1.28% in Sebha) and (4.0%) in Tripoli respectively. However, Dar and Friend* and Salem *et al.* reported *E. histolytica* / *Entamoeba dispar* commonest protozoan (44.4% and 35.9% in closed communities in Benghazi and Libyan patients in Sirt respectively). Ali *et al.* also reported a higher prevalence of *E. histolytica* / *Entamoeba dispar* (11.8 %) among children in Zliiten city. In accordance with the present findings, Ahmad, Ben Mousa and Ben Mousa and Ibrahim also reported lower prevalence of *G. lamblia* among general population of Sebha city and in school aged children in Tripoli respectively. However, Dar *et al.* and Sadaga and Kassem reported *G. lamblia* was most common in Northern, Libya (11.4% in Benghazi and 12.7% in Derna city respectively).

Prevalence of non pathogenic protozoan, *E. coli* and *T. hominis* was found to be low in the various localities in Wadi Al-Shati region. Similar findings have been reported by others in Libya.*

The prevalence of *Cryptosporidium* spp. is higher in tropical regions (up to 10 %) than temperate regions and varies from 0.5 % to 1.91 % among hospitalized pediatric diarrhea cases in the different parts of the world. In Libyan Arab Jamahiriya, limited studies are carried out for the diagnosis of cryptosporidiosis which describes the incidence of *Cryptosporidium* spp range from 3.19 % to 13.0 % in the patients. *Cryptosporidium* considered a form of zoonosis, who reported more incidence of *Cryptosporidium* spp. among patients were living in areas of farms, where cattle are reared and houses with poor disposal.

Regarding *Cryptosporidium* spp., in the present study, out of 1192 stool samples examined, only 30 samples (2.5%) showed positive results.

*Cryptosporidium* are transmitted in feces, and infections are thought to be spread from animal to human as well as human to human in Wadi Al-Shati province as some people have animals in the farm houses. Although, a municipal system of water collection exists near their houses in rural localities and may be favorable for the transmission of *Cryptosporidium* spp. in the random population.

In the literature, most of the studies made in Libya showed data only on the prevalence of protozoan parasites in the population or patients.

In the present study, out of 1192 stool specimens examined, only one sample was found positive for *Ascaris lumbricoides*. No other helminthes infections were recorded in Wadi Al-Shati region. These results are consistent with data obtained in a study carried out in Sebha city, who reported of 1868, none of stool sample showed any helminthes. Moreover, lower prevalence of helminthes infections were also reported in Sebha. This is probably due to weather condition (dry and hot) of Wadi Al-Shati province, which may be determining a not very favorable environment for the survival and development of helminthes in this region. Lower prevalence rates of helminthes infections also have been found in Benghazi, in Tripoli and in Derna. However, contradictory results were reported by Ben Mousa, who found that prevalence of *A. lumbricoides* (20.0 %) was much higher than the other parasites detected (6 % *H. nana*, 2 % *Taenia saginata*, 14 % *T. trichiura*, 4.0 % *E. vermicularis*, 4.0 % *Entamoeba histolytica* / *Entamoeba dispar*, 4.0% *E. coli* and 2.0% *G. lamblia*) among school aged children in Tripoli.

Reference: